

Mars 2020 Mission / Perseverance Rover
Inset: Mars Helicopter

EXPLORE MOON *to* MARS

Mars 2020 Mission / Perseverance Rover

Searching for Ancient Life, Gathering Rocks and Soil

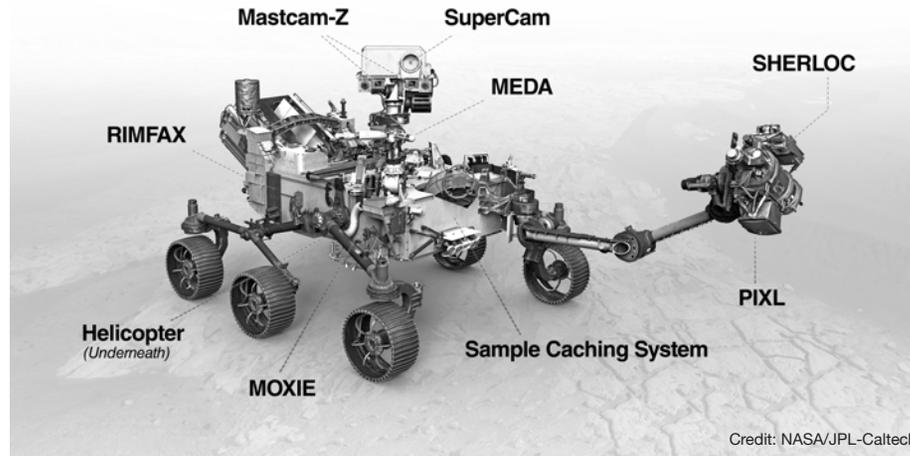
The Mars 2020 Mission Perseverance Rover will advance the quest to explore the past habitability of Mars by searching for signs of ancient microbial life. A drill on the rover will collect core samples of Martian rock and soil, then store them in sealed tubes for pickup by a future mission that would ferry them back to Earth for detailed analysis. Perseverance will also test technologies that may help pave the way for future human exploration of Mars.

Objectives

- Explore a geologically diverse landing site
- Assess ancient habitability
- Seek signs of ancient life, particularly in special rocks known to preserve signs of life over time
- Gather rock and soil samples that could be returned to Earth by a future NASA mission
- Demonstrate technology for future robotic and human exploration

An Ideal Location: Jezero Crater

Perseverance will touch down in Jezero crater, an impact crater north of the Martian equator. Jezero's intriguing history as the site of an ancient river delta and lake led to its selection out of 60 candidate locations. Scientists believe the crater may hold ancient organic molecules and other potential signs of microbial life that were preserved billions of years ago. The site should yield a bounty of minerals and rock types for the rover to sample, making it an ideal place for Perseverance to carry out its mission. Because of its challenging terrain, no previous Mars mission has attempted a landing at Jezero Crater. For Perseverance, a new Terrain-Relative



Navigation capability added to the entry, descent and landing system boosted confidence in the spacecraft's ability to avoid hazardous areas.

Key Instruments

- **Mastcam-Z**—advanced cameras for science investigations and rover operations, with zoom capability
- **MEDA** (Mars Environmental Dynamics Analyzer)—measures temperature, wind speed and direction, pressure, relative humidity, dust size and shape
- **MOXIE** (Mars Oxygen ISRU Experiment)—technology demonstration to produce oxygen from carbon dioxide in the Martian atmosphere
- **PIXL** (Planetary Instrument for X-ray Lithochemistry)—provides detailed detection and analysis of chemical elements
- **RIMFAX** (Radar Imager for Mars' Subsurface Experiment)—offers centimeter-scale resolution of geologic structure below the Martian surface

- **SHERLOC** (Scanning Habitable Environments with Raman & Luminescence for Organics and Chemicals)—detailed detection of mineralogy and organic compounds
- **SuperCam**—provides imaging, chemical composition analysis and mineralogy

Quick Facts

Launch: July 30, 2020

Landing: Feb. 18, 2021

Mission Duration: At least one Mars year (about 687 Earth days)

Landing Site: Jezero Crater, site of an ancient river delta

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Mars Helicopter Technology Demonstration

The Mars Helicopter, Ingenuity, is a technology demonstration to test powered flight on another world for the first time. It's hitching a ride to Mars on the Perseverance rover. A series of flight tests will be performed over a 30-Martian-day window that will begin sometime in the spring of 2021.

For the very first flight, the helicopter will take off a few feet from the ground, hover in the air for about 20 to 30 seconds, and land. That will be a major milestone: the very first powered flight in the extremely thin atmosphere of Mars! After that, the team will attempt additional experimental flights of incrementally farther distance and greater altitude. After the helicopter completes its technology demonstration, Perseverance will continue its scientific mission.

Size: 4-foot-diameter (1.2-meter-diameter) rotor system, with two pairs of counter-rotating blades

Weight: 4 pounds (1.8 kilograms)

The Mars 2020 Project and Mars Helicopter Technology Demonstration are managed for NASA's Science Mission Directorate, Washington, by the Jet Propulsion Laboratory (JPL), a division of Caltech in Southern California.



Artist's concepts of Perseverance Rover and Mars Helicopter Ingenuity

Credit: NASA/JPL-Caltech